

# **Detecting River Inflows using Airborne Thermal Scanner Imagery**

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## **Abstract**

The modern airborne thermal scanner can be a powerful tool for detecting and mapping locations where inflows such as pipe discharges, tributary streams, and other point sources enter a river. This detectability is made possible by the thermal sensor's capability to measure and record water temperature differences on the order of 0.1 °C while flying over the river at speeds in excess of 100 miles per hour. Swath width of the thermal imagery is typically 2,800 ft (at 2-foot ground resolution), and hundreds of river miles can be covered in a single nighttime mission. Recent thermal mapping projects along Ohio and Kanawa Rivers provide dramatic examples of the nature and frequency of inflows, many of which appear to be associated with industrial activity. Once located on the thermal imagery, the significance of each inflow site can be evaluated by considering the thermal data in conjunction with other site information.



Figure 1. Example of industrial discharge emanating from under the water surface. Temperature patterns in the river have been visually enhanced by contrast stretching. Note the ambient river temperature varies at the surface producing a “mottled” appearance.

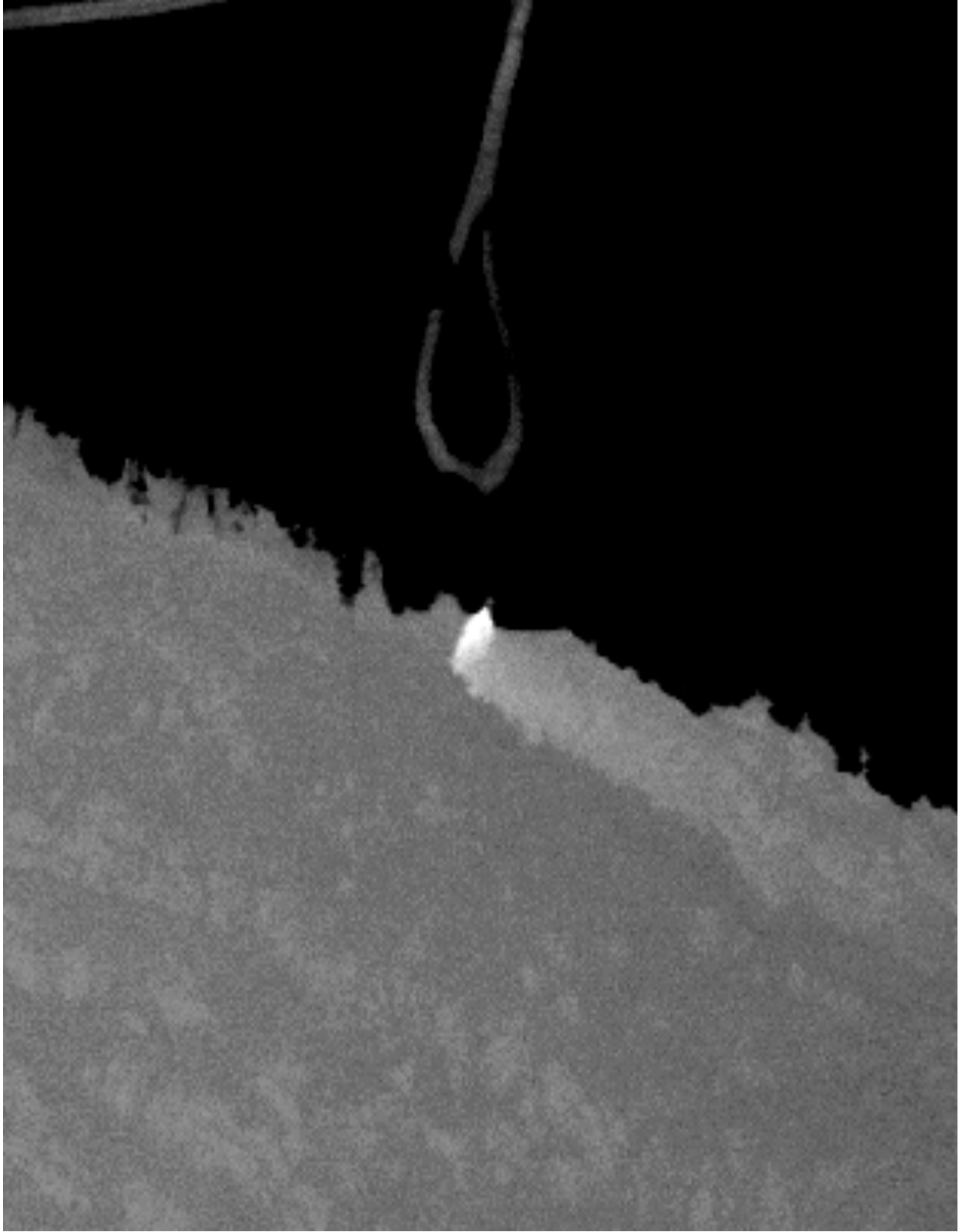


Figure 2. Example of point discharge from pipe into the river channel. In this instance the discharge is flowing into the river from above the water level.

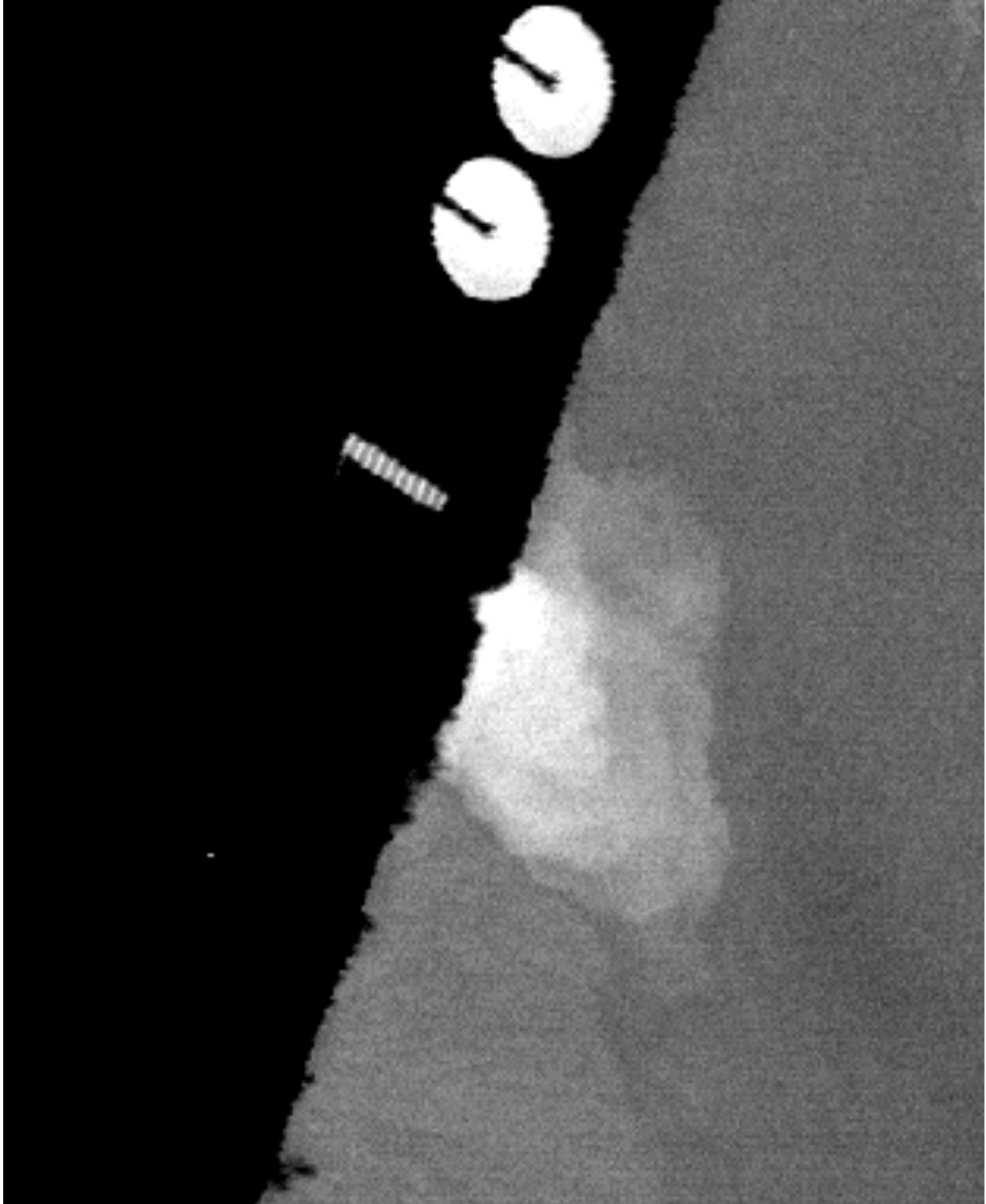


Figure 3. Example of diffuse flow into river channel from storage tank complex. No evidence of above ground discharge pipe was visible on the shore, suggesting source was relatively large drainage ditch or canal.



Figure 4. Example of underwater discharge from power-generating station temporarily blocked by docked coal barge. Discharge 7 degrees warmer than ambient river temperature in this instance.